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ABSTRACT

This final report details the results of an experimental program sponsored by the Mississippi State University (MSU) Special Teaching Projects Program which examined the effectiveness of video materials in a college economics classroom. The empirical results indicate that when video lessons are used as part of a course, students demonstrate significant degrees of overall learning based on standardized pre- and post-test scores using the Revised Test of Understanding in College Economics (TUCE). However, the results also suggest that video instruction may be weak in generating certain cognitive categories of learning (e.g., the application of graphical and mathematical economic tools and the ability to apply explicitly stated economic concepts and relationships to solve particular problems), and that additional teaching techniques may be required to enhance the effectiveness of video usage. Copies of a subject release form and a demographic questionnaire are appended. (3 references) (Author/GL)

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ENRICHMENT OF THE UNDERGRADUATE ECONOMICS AND FINANCE CURRICULUM THROUGH ECONOMICS U$A: FINAL REPORT

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I. INTRODUCTION

This Final Report details the activities undertaken to fulfill the obligations of the 1987-1988 Special Teaching Projects award to the author for the proposal "Enrichment of the Undergraduate EFALS Curriculum Through Economics U$A." This proposal specifically requested funding for the Department of Economics, Finance and Applied Legal Studies (EFALS) in the purchase of a series of specialized video programs (Economics U$A) that were to be used throughout the department's undergraduate curriculum. The proposal indicated that the author would oversee the purchase of the materials and the integration of the videos into specific courses. Additionally, the author was to conduct an experiment to analyze the effectiveness of the new materials in the classroom. Each of these activities has been completed and is discussed within this report. Section II describes the materials that were purchased with the award funds, Section III discusses the initial integration of the videos in the classroom, Section IV presents the experimental evaluation procedures and the results. General conclusions and recommendations are briefly discussed in Section V. The Final Budget immediately follows Section V.

The author would like to thank the EFALS faculty and Department Head, the Division of Business Research, and the Dean of the College of Business and Industry for their support in the successful completion of this project.

II. PURCHASE OF MATERIALS

The original proposal requested $1867.50 for the purchase of one complete set of the Economics U$A telecourse series. (Economics U$A is a state-of-the-art set of 28 half-hour video lessons designed to be used

in the Principles of Economics two course sequence. A complete description of Economics U$A can be found in the original proposal.) After funding for the proposal had been approved the distributors of Economics U$A informed the author that a dramatic increase in the educational discount would become effective late in the Spring of 1988. The purchase order for the videos was delayed to take advantage of the very substantial discount. The price change allowed the department to acquire two copies of Economics U$A and to supplement the series with a variety of instructional video programming. In addition to the Economics U$A tapes the department purchased a set of Milton Friedman's Free to Choose PBS series (19 tapes), four programs from the Films for the Humanities' Economics series, five videos on the Corporation in American Life from California Newsreel, three programs from the Current Economic Affairs Videotape Series, and one program from the Roosevelt Center for American Policy Studies on current labor market trends. Finally, residual funds have been used to order video cassette storage boxes to preserve the tapes and ensure their long life. A complete accounting of the allocation of award funds can be found in the Final Budget located immediately before the Appendix of this report.

III. INTEGRATION OF THE VIDEOS INTO THE CURRICULUM

As outlined in the original proposal, the author assumed responsibility for the initial integration of the new video materials within various courses of the EFALS curriculum. As part of this process, the author sought out consultation and advice from the department's faculty concerning the choice of programs purchased to supplement the Economics U$A series. Additionally, the author took special care to keep the faculty informed about the purchase and availability of each new

acquisition. The author served as a "video librarian" and resource person regarding the scheduling of tape and VCR usage within the department. Approximately one-half of the faculty used at least one of the new videos in their classroom during the Fall 1988 semester. Specific courses in which the videos were used include EC 1113, EC 1123 (the Principles of Economics sequence), EC 1193 (Honors: Principles of Economics II), EC 3143 (Intermediate Economic Analysis), EC 3213 (Labor Economics), EC 5153/7153 (National Income and Employment Analysis), EC 5313/7313 (Introduction to Regional Economics), FIN 2113 (Money and Banking), and FIN 3323 (Financial Institutions). The response from the faculty has been positive and it is anticipated that usage of the materials will remain high.

IV. THE EXPERIMENT

In order to evaluate the effectiveness of the Economics U$A videos in the classroom the author conducted a controlled educational experiment using two sections of EC 1113 (Principles of Economics I) during the Fall 1988 semester. One section served as a CONTROL group and was exposed to the traditional lecture method of instruction. The other section served as the EXPERIMENTAL group and watched the Economics U$A series as part of their in-class experience. Both sections were taught by the same instructor (the author) at a similar time of day, covered the same material and were given the same examinations. Each student in both sections was asked to sign a human subjects release form. Demographic information on each student was collected by questionnaire and student learning was measured using standardized testing techniques. (Sample copies of the release form and the questionnaire are included in the Appendix.)

The degree of learning that the students in the two sections exhibited at the end of the semester was estimated using a pre- and post-course administration of the Revised Test of Understanding in College Economics (TUCE). The TUCE is a standardized normed test designed to measure the extent of economic knowledge of students in introductory college economics courses. The TUCE was specifically created by the Joint Council on Economic Education and the American Economic Association's standing Committee on Economic Education to serve as a measuring device in controlled experiments such as this one. The two student groups were administered the TUCE twice, once at the beginning of the course and again at the end. The difference between the pre-course TUCE score and the post-course TUCE score serves as a measure of student learning.

The TUCE is a thirty question multiple-choice examination that allows for the identification of changes in three cognitive categories of economic learning. These categories include: Recognition and Understanding - the ability to recall, identify, and define economic terms and concepts; Explicit Application - the ability to apply explicitly stated economic concepts and relationships to solve a particular problem; and Implicit Application - the ability to apply economic reasoning to solve problems involving unstated assumptions or extraneous information. Each cognitive category is given equal weighting on the TUCE (10 questions per cognitive category). A measure of a student's comprehensive understanding of economics is obtained by summing the TUCE score across each of the three cognitive categories.

The absolute and relative impact of the Economics U$A videos on student learning can be determined by calculating and analyzing the change in TUCE scores for each of the two groups. (A copy of the TUCE

can be obtained by writing to the Joint Council on Economic Education, New York, NY 10016.)

As seen in Table 1 the demographic composition of the two student groups is fairly homogeneous. Slight differences do exist in the sex and racial balance of the two groups. However, previous studies have not generally shown strong and significant differences in learning due to these variables. The literature suggests that age and past academic experience is more important in determining the degree of student learning (see, Siegfried and Fels, 1979). As Table 1 indicates, only very small differences exist in the mean age and composition of the groups by class rank and college major. For the purposes of this study it will be assumed that the two groups are comparable in nature.

Using the data collected from each of the class groups, two major research questions were addressed. First, did students within each class group demonstrate a significantly measurable degree of economic learning across the cognitive categories of the TUCE? Second, is there a significantly measurable difference between the class groups in the degree of economic learning across the cognitive categories of the TUCE?

The data presented in Table 2 addresses the first research question. The mean Pre-Test and Post-Test scores are reported for both class groups by cognitive category. Table 2 clearly shows that the mean Post-Test scores are greater than the Pre-Test scores for both groups across all cognitive categories. The null hypothesis that the Post-Test scores are equal to the Pre-Test scores for each cognitive category was tested using standardized t-tests. In all but one case the t-values indicate that the Post-Test scores are significantly greater than the Pre-Test scores at the .01 level of confidence. The single exception is found with respect to the Explicit Application category for the

TABLE 1

SELECTED DEMOGRAPHIC CHARACTERISTICS OF STUDENT GROUPS

	CONTROL GROUP	EXPERIMENTAL GROUP
Mean Age	20.59	19.55
Sex:		
% Male	41.17	52.83
% Female	58.83	47.17
Race:		
% White	76.47	84.90
% Minority	23.53	15.10
Class Rank:		
% Freshman	7.84	3.77
% Sophomore	70.59	79.25
% Junior	9.80	11.32
% Senior	5.88	3.77
% Graduate/Other	5.88	1.88
Major:		
% College of Business	70.59	75.47
% Other	29.41	24.53
N	51	53

TABLE 2

MEAN PRE- AND POST-TEST SCORES BY CLASS GROUP AND COGNITIVE CATEGORY

	PRE-TEST	POST-TEST	t-VALUE
Control Group			
Recognition	3.62 (1.62)	5.10 (2.00)	4.10*
Explicit Application	3.02 (1.32)	3.75 (1.57)	2.54*
Implicit Application	3.06 (1.64)	3.88 (1.74)	2.45*
Overall	9.51 (3.44)	12.73 (4.06)	4.32*
Experimental Group			
Recognition	3.35 (1.37)	5.15 (1.65)	5.99*
Explicit Application	2.88 (1.31)	3.08 (1.68)	0.68
Implictit Application	2.88 (1.53)	3.98 (2.08)	3.10*
Overall	8.94 (3.21)	12.13 (3.95)	4.56*

( ) - Standard Deviation.

t-Value tests the null hypothesis that the Post-Test score is equal to the Pre-Test score within class groups.

* - Significant at the .01 level of significance, one tailed test.

EXPERIMENTAL group. These results indicate that students in the CONTROL group demonstrated significant degrees of learning across all the cognitive categories measured by the TUCE and students in the EXPERIMENTAL group experienced a significant degree of learning overall and in the Recognition and Implicit Application categories. Such results tend to suggest that the Economics U$A videos may be weak in teaching students the application of the graphical and mathematical economic tools relevant to the Explicit Application category of the TUCE.

The data in Table 3 addresses the second research question concerning the relative effectiveness of Economics U$A. The mean changes in TUCE scores for each class group are reported across cognitive category. The null hypothesis that the mean changes in TUCE scores are equal between class groups by cognitive category was tested by once again using a standardized t-test. The results indicate no significant difference in the degree of student learning overall and in the Recognition and Implicit Application categories. A marginally significant difference is found between the groups in the Explicit Application category. As seen in Table 3 the EXPERIMENTAL group demonstrated a smaller change in their mean Explicit Application score relative to the CONTROL group. Again, the results tend to suggest that the Economics U$A videos are weak in this category of economic learning.

V. CONCLUSIONS AND RECOMMENDATIONS

Several important conclusions can be drawn from the results of the experiment reported here. First, it should be noted that students exposed to the Economics U$A videos demonstrated statistically the same degree of overall learning as those students who did not watch the videos. In order to show the video lessons in the EXPERIMENTAL section,

TABLE 3

MEAN CHANGES IN TUCE SCORE BY CLASS GROUP AND COGNITIVE CATEGORY

	CONTROL GROUP	EXPERIMENTAL GROUP	t-VALUE
TUCE			
Recognition	1.55 (2.48)	1.87 (2.15)	0.71
Explicit Application	0.78 (1.64)	0.25 (2.19)	1.39*
Implicit Application	0.88 (1.91)	1.08 (2.52)	0.46
Overall	3.22 (3.70)	3.19 (5.02)	0.04

( ) - Standard Deviation.

t-Value tests the null hypothesis that the mean changes in TUCE scores are equal between class groups.

* - Significant at the .10 level of significance, one tailed test.

the instructor had to reduce the normal lecture and question and answer time in class. Thus, it appears that the videos do serve as a substitute for this activity in a general overall sense. However, the results have pointed out that the Economics U$A videos are weak in both an absolute and relative sense with respect to the graphical and mathematical concepts measured by the Explicit Application category. These results are consistent with previous analyses of the Economics U$A videos on student learning (see, Grimes, Nielson, and Niss 1988; Grimes, Krehbiel, Nielson, and Niss, 1989). One can conclude that the videos may not be a perfect substitute for teaching the skills necessary for student achievement in this area of learning. Learning theory suggests that watching a video lesson is normally a passive activity whereas the Explicit Application category of the TUCE measures concepts best learned through active practice and performance.

These results should not discourage the use of videos in the classroom. To the contrary, the results indicate that videos can be a central component of a course in which students demonstrate significant degrees of overall learning. However, the results do suggest that the instructor should be careful to identify the areas of learning where video lessons will not be most effective and to supplement classroom instruction with activities that will make up for any deficiencies. The producers of video courses like Economics U$A have recognized this problem and are currently developing new instructional materials, including interactive computerized tutorials, to enhance the potential effectiveness of the technology.

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Grimes, P., Krehbiel, T., Nielsen, J., and J. Niss. 1989. The effectiveness of Economics U$A on learning and attitudes. **The Journal of Economic Education** 20 (Spring).

Siegfried, J. and R. Fels. 1979. Research on teaching college economics: a survey. **Journal of Economic Literature** 17 (September): 923-69.

FINAL BUDGET

ORIGINAL AWARD	$1867.50
Expenditures	
Economics USA telecourse series (2 sets) Films Inc.	$495.00
Free to Choose PBS series (1 set) Video SIG	$213.00
"At Work in the New Economy" Roosevelt Center for American Policy	$75.00
The Corporation in American Life (1 set) California Newreel	$505.00
Economics (4 videos from the set) Films for the Humanities	$415.80
"Current Economic Affairs" (1 set) Baylor University	$115.00
Video Cassette Storage Boxes/Head Cleaner Publishers Central Bureau	$40.92
TOTAL	$1859.72

APPENDIX

Exhibits:

Subject Release Form

Demographic Questionnaire

Revised Test of Understanding College Economics (TUCE)

STUDENT RELEASE

Your class has been selected to participate in a study of student learning in a Principles of Economics course. The study will evaluate classes that use different teaching techniques and learning devices. In particular the study will examine if the use of the **Economics U$A** video lessons helps students learn economics in a more efficient manner.

Your help in the study is needed. Specifically, we ask that you complete a simple questionnaire and an attitude survey. Additionally, we will administer a standardized multiple choice test that will tell us how much economics you know going into this course. At the end of the semester we will give the test again. The difference in your scores will tell us how much you learned from the class.

Be assured that your performance on the standardized tests will in no way affect your course grade or your academic record. Your individual scores will be kept confidential. Only information regarding total class performance (e.g. average class scores) will be made public. You are not required to participate in the study. However, the information gained from your participation will help us decide how this class should be taught in the future. Your participation will help us to make a better decision.

You may choose to help us by signing the following statement:

I UNDERSTAND THE NATURE OF THIS STUDY AND WISH TO PARTICIPATE.

_____ _____

Signature

Name _____

Please circle the correct response or fill in the blank.

1. What is your sex? (1) Male (2) Female

2. What is your race? (1) White (2) Black (3) Other

3. What is your age? _____

4. What was your class standing at the beginning of this term?
(1) Freshman (2) Sophomore (3) Junior (4) Senior (5) Other

5. What is/will be your college major? _____

6. What is your primary motive for taking this course? (1) Required
(2) Elective (3) Personal Growth

7. What grade to you expect to receive for this course? (1) A (2) B
(3) C (4) D (5) F

8. Did you take a separate course in Economics while you were in high school? (1) Yes (2) No

9. Are you currently employed (or self-employed)? (1) Full-time
(2) Part-time (3) Not Employed

10. Are you actively seeking a degree? (1) Yes (2) No

11. What is the highest college degree you expect to earn in your lifetime? (1) Bachelors (2) Masters (3) Doctorate

12. Have you ever taken a formal course dealing with the use of computers? (1) Yes, in High School (2) Yes, in College (3) No

13. Do you own a personal computer? (1) Yes (2) No